

THE *PROTOPTILA* GROUP OF THE
GLOSSOSOMATINAE
(TRICHOPTERA : RHYACOPHILIDAE)

MARTIN E. MOSELY *Xuf*

Pp. 315-346 ; 86 *Text-figures*

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 3 No. 9
LONDON: 1954

THE BULLETIN OF THE BRITISH MUSEUM
(NATURAL HISTORY), *instituted in 1949, is
issued in five series corresponding to the Departments
of the Museum, and an Historical Series.*

*Parts appear at irregular intervals as they become
ready. Volumes will contain about three or four
hundred pages, and will not necessarily be compiled
within one calendar year.*

*This paper is Vol. 3, No. 9 of the Entomological
series.*

PRINTED BY ORDER OF THE TRUSTEES OF
THE BRITISH MUSEUM

Issued October, 1954

Price Ten Shillings

THE PROTOPTILA GROUP OF THE GLOSSOSOMATINAE

(TRICHOPTERA : RHYACOPHILIDAE)

By MARTIN E. MOSELY*

IN 1937, when describing some Mexican Hydroptilidae (*Trans. R. ent. Soc. Lond.* 86 : 151-190), I remarked of *Protoptila* : "It is perhaps open to question whether *Protoptila* should not be placed in the Rhyacophilidae rather than the Hydroptilidae." Following this suggestion Dr. H. H. Ross, writing in 1938 (*Ill. Nat. Hist. Surv. Bull.* 21 : 112), placed the genus in the Rhyacophilidae, subfamily Glossosomatinae. For my part I retained the genus in the Hydroptilidae for the time being, as I had a large amount of Mexican material still unsorted and considered that there was a possibility that more new genera belonging to the group might be found when I should be able to spare the time for a further examination. When describing Brazilian Hydroptilidae (1939, *Novit. Zool.* 41 : 218-224), I erected two new genera akin to *Protoptila*, still retaining the group in the Hydroptilidae. Subsequently I received a letter from Dr. G. Ulmer in which he wrote "I am now sure that *Mortoniella* and *Protoptila* do not belong to the Hydroptilidae but to the Glossosomatinae of Rhyacophilidae. . . . If *Mortoniella* and *Protoptila* are Glossosomatinae, then the genera *Mexitrichia*, *Canoptila* and *Antoptila* will belong also to this subfamily, perhaps *Padunia* Mart. (?)" . On receipt of this letter I determined to complete my examination of the Mexican material and to deal with all the genera concerned. It was my own inclination to make a new subfamily of the Rhyacophilidae to take these kindred genera, but as both Ulmer and Ross consider that there is close relationship in the earlier stages to genera in the Glossosomatinae, I accepted their view and make the transfer accordingly.

The genus *Protoptila*, the first to be described in the group, probably contains a great number of species, but in this paper I propose to confine myself to those Mexican and Brazilian genera and species with which I am personally acquainted. Dr. Ross has described many more from North America in his papers on Illinois Trichoptera. Other genera in the group are *Mexitrichia* (Mexico and Brazil), *Mortoniella* (Brazil), *Antoptila* (Brazil), *Canoptila* (Brazil) and a new genus from Mexico, described in this paper under the name *Culoptila*, found in the material which I had set aside for further examination. With regard to *Padunia* Martynov, if this genus should really prove to be associated with *Protoptila* and its allies (of which Ulmer does not seem to be entirely convinced), attention should be drawn to the far more complete neuration of the posterior wing, as figured by Martynov, than is to be found in any

* Mr. Martin E. Mosely died in 1948.

of the other genera in the group, although that of the anterior wing agrees tolerably well with at least *Antoptila*.

All the genera in the group are characterized by a pale streak at the anastomosis, covering the cross-veins from the radius to the media, which are always aligned, the remaining cross-veins of the anastomosis generally continuing the line down to the post-costa. The new genus *Culoptila* is remarkable for the extraordinary development of the tegulae which, in the male sex, are enlarged to form hollow caps, at the base of which is situated a structure that no doubt functions as a scent-organ. More will be found about this structure in the generic account.

All the species in these genera have a ground-colour of chestnut brown; in some of the Brazilian species the anterior wings are decorated with silver bars, particularly along the anastomosis. When denuded, it is seen that the membrane at the anastomosis is coloured yellow. It may be added that in the anterior wing of *Protoptila* there is a short arc of stiff bristles situated on the membrane between Cu_2 and the anal veins. In the other genera of the group this arc is represented by a short straight row of similar bristles arising from the posterior margin of Cu_2 . All species have a ventral process to the sixth sternite, that of *Culoptila* being somewhat peculiar in form.

The Mexican species described in this paper were collected by Dr. Adolph Dampf, and all the types are deposited in the British Museum (Nat. Hist.).

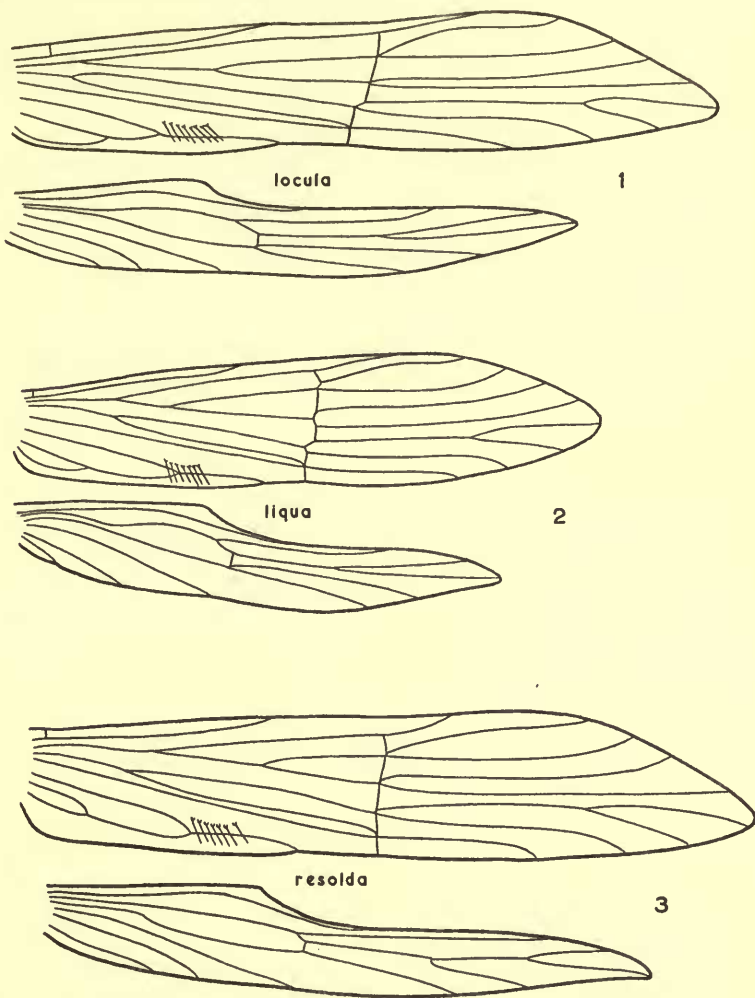
Finally, I must acknowledge the help given me by Mr. D. E. Kimmins, of the Dept. of Entomology, who has not only drawn all the figures illustrating this paper, but has also put his younger eyes at my disposal in making out the very intricate and obscure structures of the genitalia of this difficult group.

Protoptila Banks

Banks, 1904, *Proc. ent. Soc. Wash.* 6: 215. Ulmer, 1906, *Notes Leyden Mus.* 28: 99; *id.*, 1907, *Gen. Insect.* 60a: 220. Betten, 1934, *N.Y. Mus. Bull.*, 292: 149. Mosely, 1937, *Trans. R. ent. Soc. Lond.* 86: 152. Ross, 1938, *Ill. Nat. Hist. Surv. Bull.* 21: 112; *id.*, 1944, *op. cit.*, 23: 41.

In the ♂, the genital characters are very obscure and it is scarcely possible to homologize them with corresponding parts in other Trichoptera species. In the descriptions I have already made, I have attempted to follow McLachlan's nomenclature of the genital parts, but my naming of such organs as "intermediate appendages," "penis-sheaths" is necessarily arbitrary. I have failed to recognize any process that could be termed an inferior appendage, though Ross describes these processes in some of his species. In many of the species, the ventral margin of the eighth segment is modified to such an extent that it is difficult to avoid the conclusion that this segment functions as a structure of the genitalia. The description "penis-sheaths" for the telescoped structures terminating in a strong and often sinuous spine is perhaps open to criticism, since penis-sheaths of this form are, so far as I know, unknown in the Trichoptera. I have hesitated as to whether they may not function as inferior appendages, but their origin seems too near the dorsal half of the ninth segment for them to be so regarded. What I have termed "intermediate

appendages" might equally be superior appendages or even processes of the dorsal plate. In a paper of this nature, it is immaterial what the parts are termed, provided that the connection between the descriptions and the figures is clearly indicated.

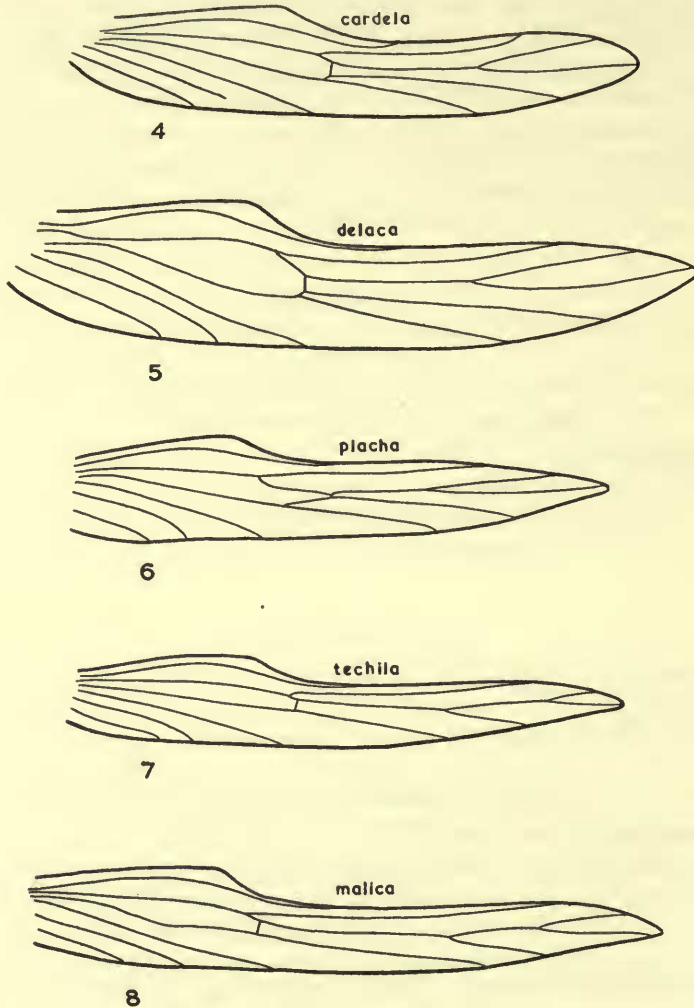


FIGS. 1-3. Neuration of wings of 1, *Protoptila locula*, ♂; 2, *P. liqua*, ♂; 3, *P. resolda*, ♂.

In the wings, the anterior is characterized by an unbroken line of nervures at the anastomosis, and the variation in the neuration seems practically to be confined to the base of apical fork no. 2, where in some species it is narrow and pointed and in others wider and blunt. In the posterior wing, where the neuration is always reduced, there are numerous irregularities in the different species.

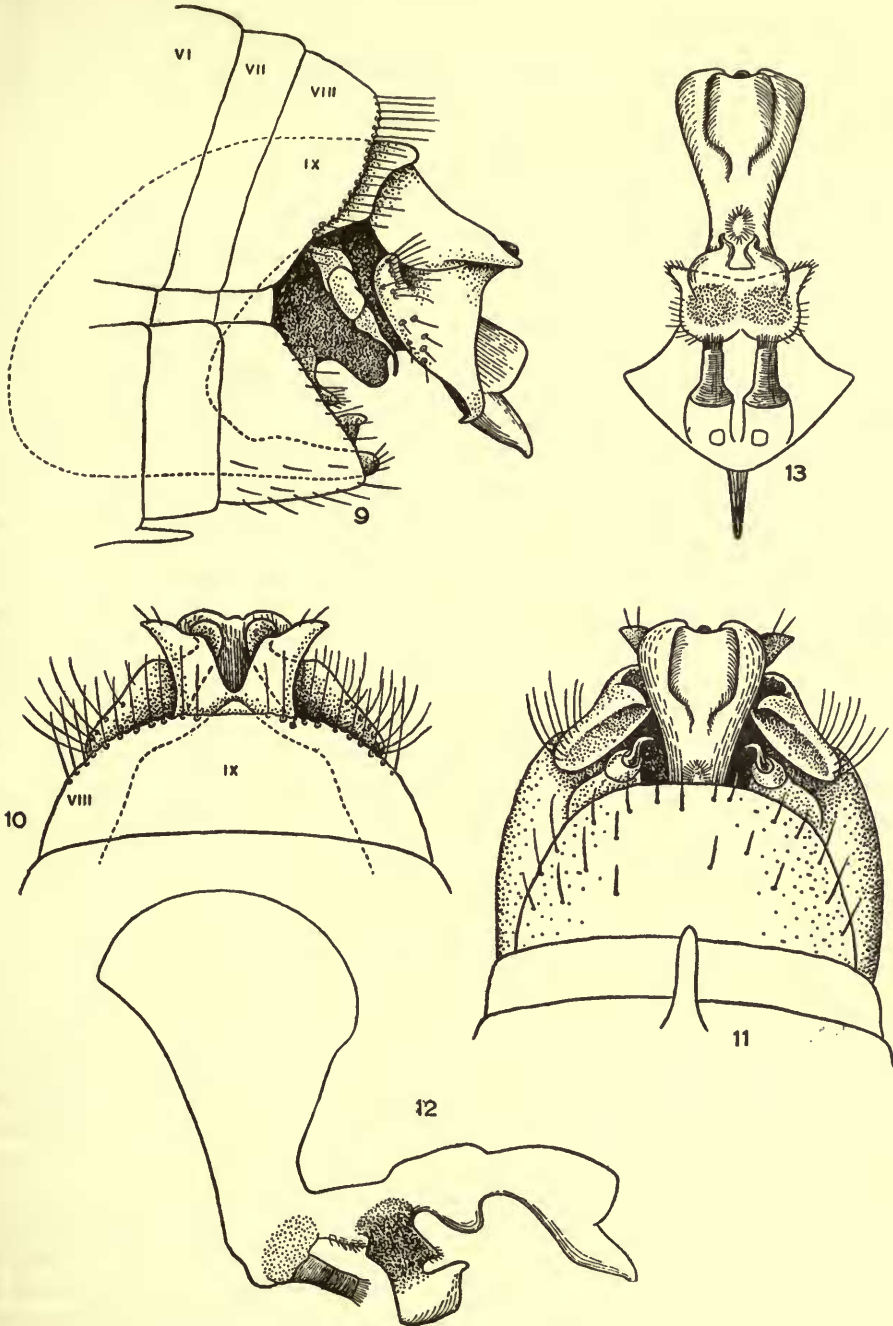
A close consideration of the descriptions of the genitalia and neuration given in

my papers of Mexican and Brazilian species shows that the genus falls into two groups, in which the presence or absence of penis-sheaths and variations in the base of apical fork no. 2 in the anterior wing may be co-related. Thus what I will term the *locula* group with narrow base to fork no. 2 and penis-sheaths present contains the following species: *locula*, *piacha*, *malica*, *techila*, *alexanderi*, *dubitans*, *resolda*.



FIGS. 4-8. Neuration of posterior wings of 4, *Protoptila cardela*, ♂; 5, *P. delaca*, ♂; 6, *P. piacha*, ♂; 7, *P. techila*, ♂; 8, *P. malica*, ♂.

What I have termed the *liqua* group, with the base of fork no. 2 broad and penis-sheaths absent contains *liqua*, *guata*, *tojana*, *delaca*, *lorada*, *rota*, *salta*, *cardela*. *Ixtala* is an exception and here the penis-sheaths are present while the base of fork no. 2 is broad in most of the examples examined. I do not consider these small differences



FIGS. 9-13. *Protoptila locula*, ♂. 9, Genitalia, lateral; 10, genitalia, dorsal; 11, genitalia, ventral; 12, penis, lateral; 13, penis, ventral.

to be of sufficient value to warrant the separation of the two groups into distinct genera.

***Protoptila locula* sp. n.**

(Figs. 1, 9-13)

Insect brownish, neuration as figured.

GENITALIA, ♂. Margin of the eighth tergite truncate, the sternite without the long production found in *P. salta*, *ixtala*, *rota* and *resolda*. Ninth segment considerably withdrawn within the eighth, from the side only the dorsal and ventral distal apices being visible. Beyond the margin of the eighth tergite can be seen the centre of the distal margin of the ninth segment, forming a small, triangular projection. Intermediate (?) appendages two-jointed; from above, basal joint visible as an out-turned, triangular projection, distal joint with a scroll-like head, broadening towards the margin of the eighth segment. Seen from the side, the appendage is directed downward, basal joint with an acute, distally directed apex; distal joint triangular, directed vertically downward, wide at the base, its apex a pointed, in-turned hook. Penis-sheaths three-jointed, short, terminal joint the longest. Penis very complicated; from the side with an irregularly-formed distal part, a projecting, blunt hook on the lower margin, and towards the base two pairs of blackened processes, the distal the larger. The basal pair form two short rods with fringed, truncate apices, the distal pair fused to make a plate as shown in the figure. There is the usual enormous, axe-headed extension of the upper surface at the base.

Length of anterior wing, ♂, 2 mm.

MEXICO: Guerrero, Cocula, 28.iii.1935, Iguala, 29.iii.1935, 21.i.1936; Michoacan, Caracuara, 1197 m., 24-29.iv, 3-5.v.1935, Nocupetara, 9.v.1935; Mexcala, 13.xii.1929.

Type, ♂ (microscope preparation), Caracuara, 24-29.iv.1935.

***Protoptila piacha* sp. n.**

(Figs. 6, 14-20)

Neuration, posterior wing as figured, anterior as in *P. locula*.

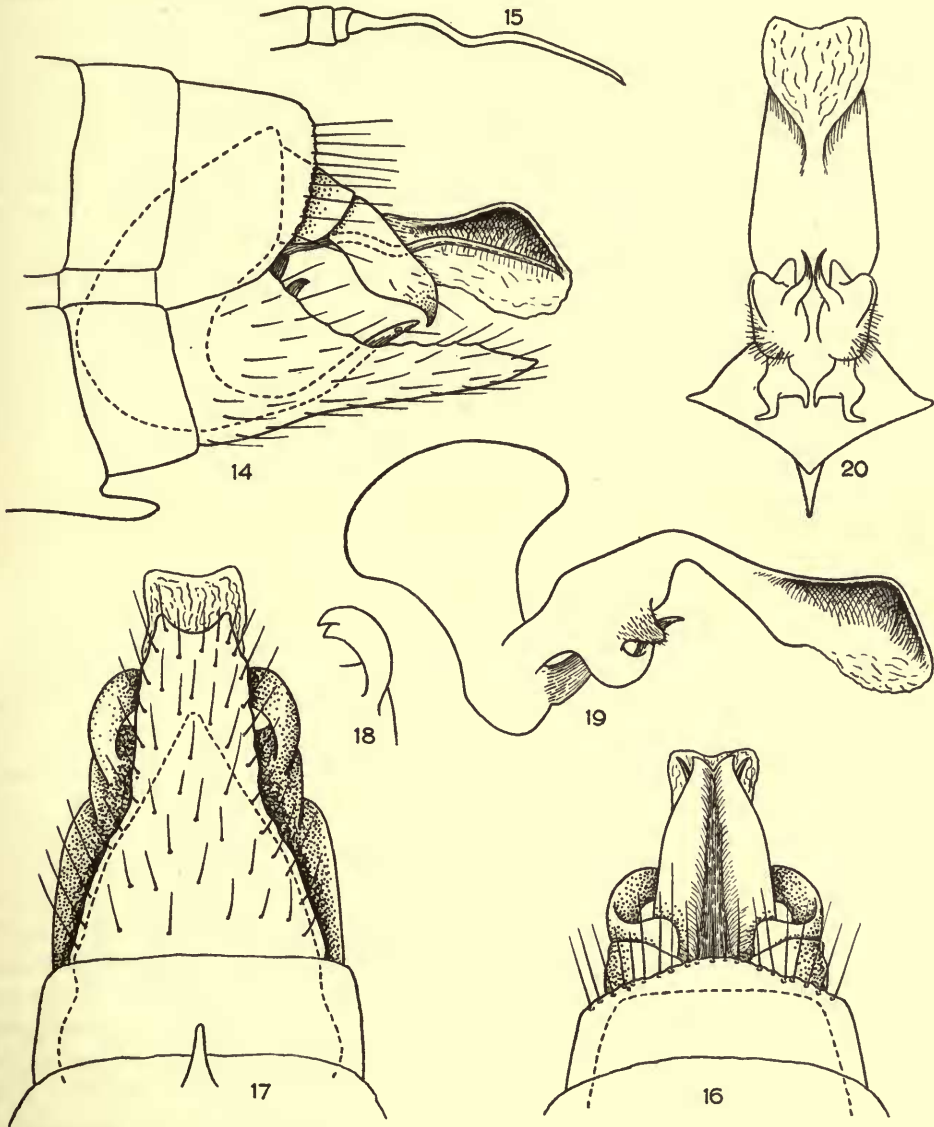
GENITALIA, ♂. From above, the margin of the eighth tergite slightly convex and serrate, fringed with long hairs; sternite strongly produced to nearly as far as the end of the penis, narrowing to a shallowly excised apex, upper margin from the side strongly serrate. Ninth segment almost completely withdrawn within the eighth, only the pointed tip of the ventral margin visible in the side view. Intermediate appendages two-jointed; from above, basal joint broad and triangular; terminal joint arises from a broad base and narrows to a pair of bands curling under the penis and, as seen from beneath, with the apices divided in two small forks. From the side, the second joint is long, lower margin sinuous, apex in the form of a down-turned hook. Penis deep, with the distal margin strongly excised, lower portion broad, separated from the upper by a shallow, lateral groove in which lies

the penis-sheath. Lower penis-cover as figured. Penis-sheaths with a very long, sinuous terminal joint, basal joints obscure, probably three-jointed.

Length of anterior wing, ♂, 2.25 mm.

MEXICO: Chiapas, Huixtla, 21.xi.1930; Guerrero, Tierra Colorada, 18.xii.1929.

Type, ♂ (microscope preparation), Tierra Colorada, 18.xii.1929.



FIGS. 14-20. *Protoptila piacha*, ♂. 14, Genitalia, lateral; 15, a penis-sheath; 16, genitalia, dorsal; 17, genitalia, ventral; 18, apex of intermediate appendage, dorsal; 19, penis, lateral; 20, penis, ventral.

Protophila malica sp. n.

(Figs. 8, 21-26)

Neuration of the posterior wing as figured, anterior as in *P. locula*.

GENITALIA, ♂. Distal margin of the eighth segment fringed with stiff hairs, somewhat serrate towards the distal end of the sternite, which projects only slightly beyond the margin of the ninth ventral segment. From beneath, the distal margins of both the eighth and ninth segments are widely excised, the excision of the eighth being more shallow than the ninth; from above the eighth tergite is slightly and widely excised, the margin of the ninth showing beyond it. From above, the basal joints of the intermediate appendages are large and triangular; from the side the appendage is directed downward, both joints rectangular, the basal the shorter and with a large, curved, lateral lobe obscuring the connection of the joints. Penis from above broad, apex excised to form two out-turned stout horns; from beneath, the excision is wider and the distal surface of the apical joint of the intermediate appendage is seen to be densely covered with small corrugations and its upper margin slightly produced to form a hook. Other structures of the penis are shown in the figures, but I am not venturing to suggest their functions nor to name the parts. Penis-sheaths three-jointed and very short, the basal joint much the longest.

Length of anterior wing, ♂, 3 mm.

MEXICO: Colima, 27.i.1930, 1 ♂ (microscope preparation).

Protophila techila sp. n.

(Figs. 7, 27-31)

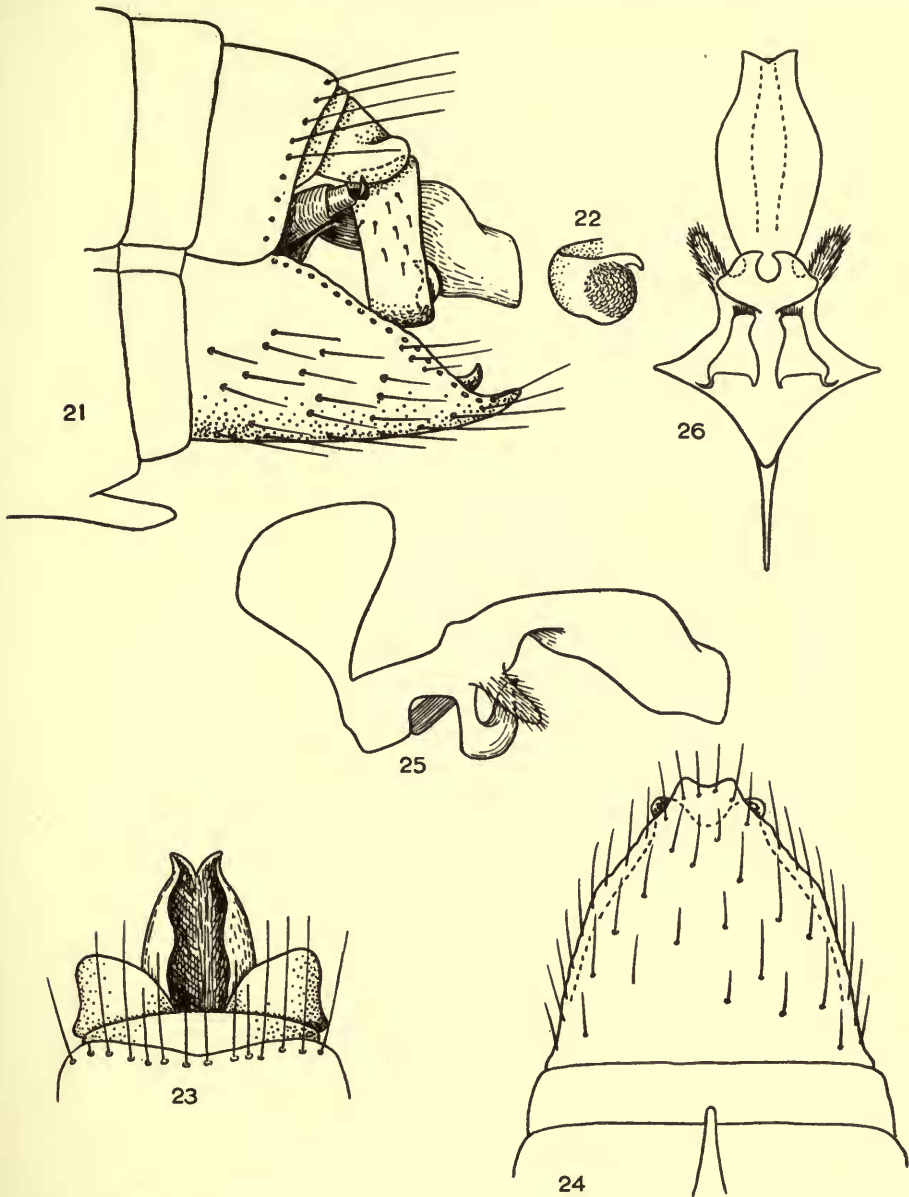
Insect brown. Antennae wanting in the single example before me. There are differences in the neuration of the posterior wing between this and other species in the genus, as may be seen by a comparison of the figures. In the anterior wing, neuration is normal and corresponds with that in *P. locula*.

GENITALIA, ♂. Ventral margin of the eighth sternite enormously produced in a wide plate with a serrate distal margin; from the side the margin is truncate, with the upper angle produced in a strong spur. Ninth segment withdrawn into the eighth, leaving the dorsal portion protruding beyond it so that, from above, it appears with the centre produced in a small, subacute triangle. The ventral margin of the ninth segment is completely concealed within the eighth; from the side it is much produced and narrows to a sinuous point. The upper penis-cover from above appears as a pair of long, sinuous processes with strongly dentate outer margins, inner margins with angular indentations at the centre. Intermediate appendages two-jointed; from above, basal joints stout, distal curving inwards with bifurcate apices, the forks short and pointed, the lower the longer. Penis-sheaths three-jointed, terminal joint spine-like and sinuous, second joint the smallest, first joint sinuous. Penis with the usual axe-headed projection of the upper margin at the base; it is complicated and fashioned after the pattern of *locula*, with various processes on the lower surface (lower penis-cover?), of which the most conspicuous is

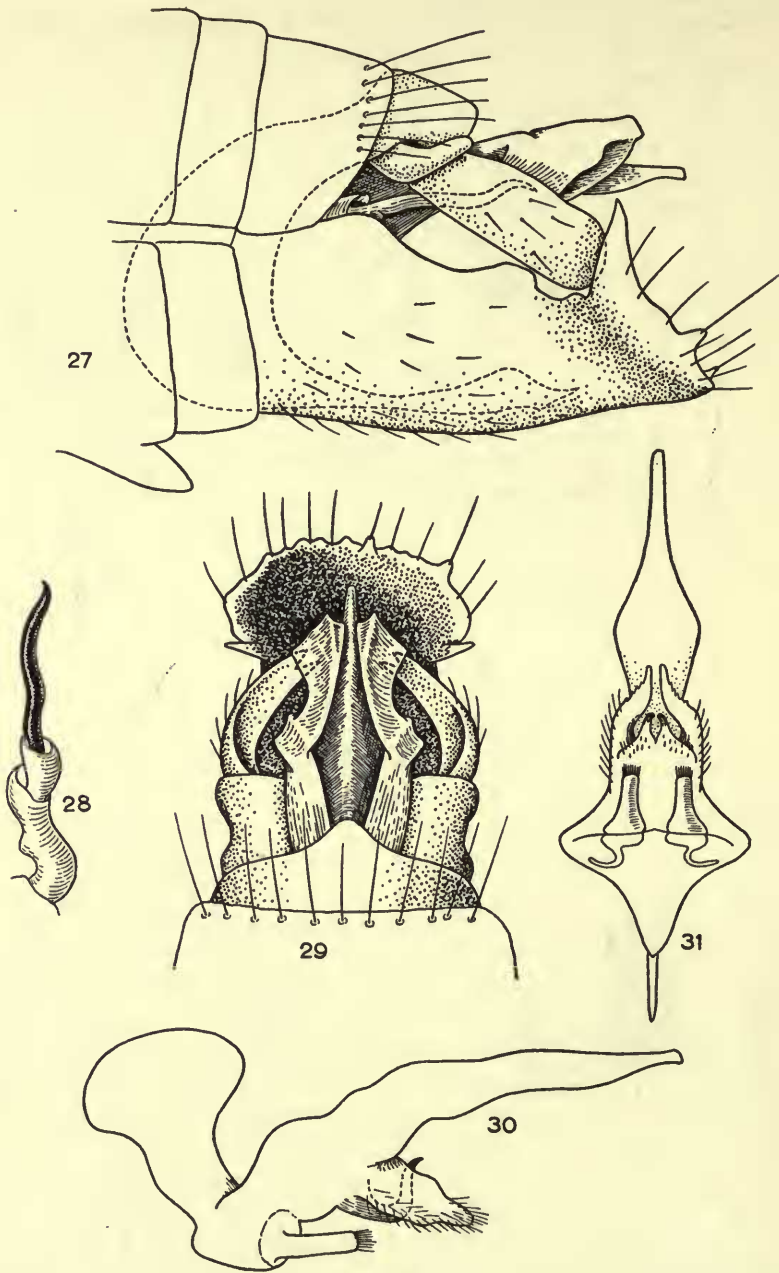
a pair of strong, up-turned hooks towards the centre, and at the base a pair of rectangular, distally directed processes with fringed apices.

Length of anterior wing, ♂, 2.5 mm.

MEXICO: Oaxaca, Rio Chiltepec, 21.iii.1932, 1 ♂ (microscope preparation).



FIGS. 21-26. *Protoptila malica*, ♂. 21, Genitalia, lateral; 22, apex of an intermediate appendage, from beneath; 23, genitalia, dorsal; 24, genitalia, ventral; 25, penis, lateral; 26, penis, ventral.

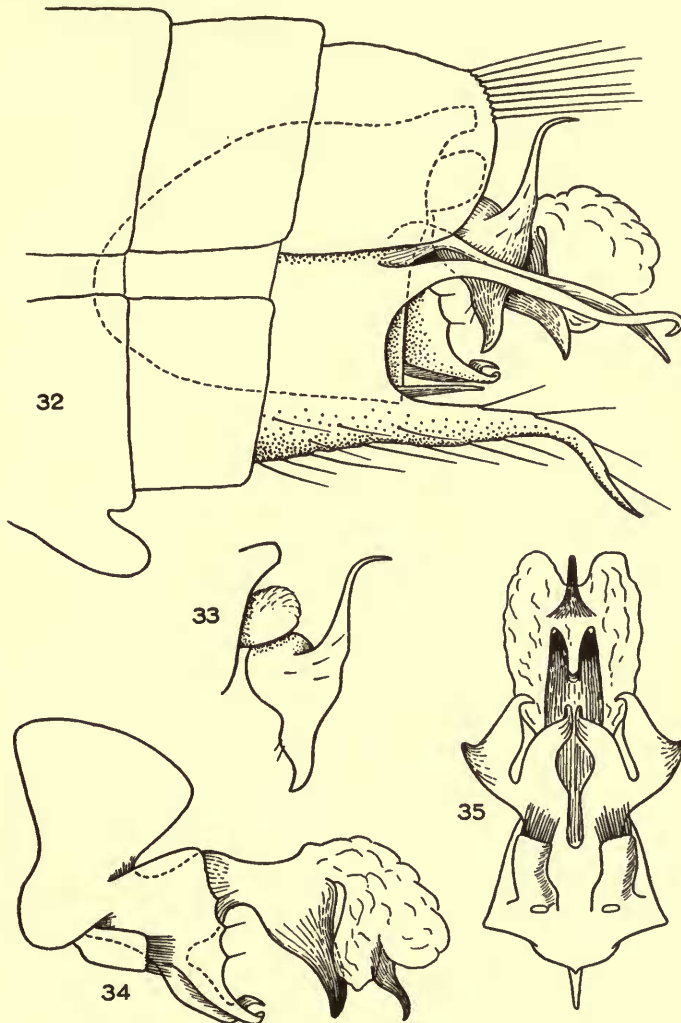


FIGS. 27-31. *Protoptila techila*, ♂. 27, Genitalia, lateral; 28, penis-sheath; 29, genitalia, dorsal; 30, penis, lateral; 31, penis, ventral.

Protoptila alexanderi Ross

Ross, 1941, *Trans. Amer. ent. Soc.* 67: 48, pl. 2, fig. 14.

Numerous examples of this species were taken in Nuevo Leon, Tamaulipas, 5.vi.1931.



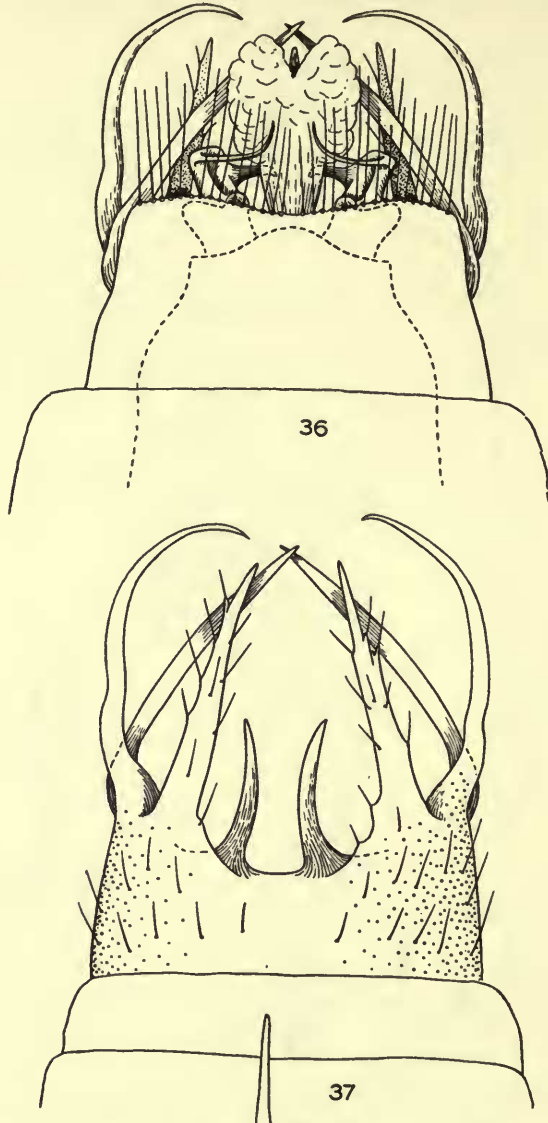
FIGS. 32-35. *Protoptila liqua*, ♂. 32, Genitalia, lateral; 33, intermediate appendage, lateral; 34, penis, lateral; 35, penis, ventral.

Protoptila liqua sp. n.

(Figs. 2, 32-37)

Insect brown. The neuration of the posterior wing differing from that of *P. techila* as shown in the figure.

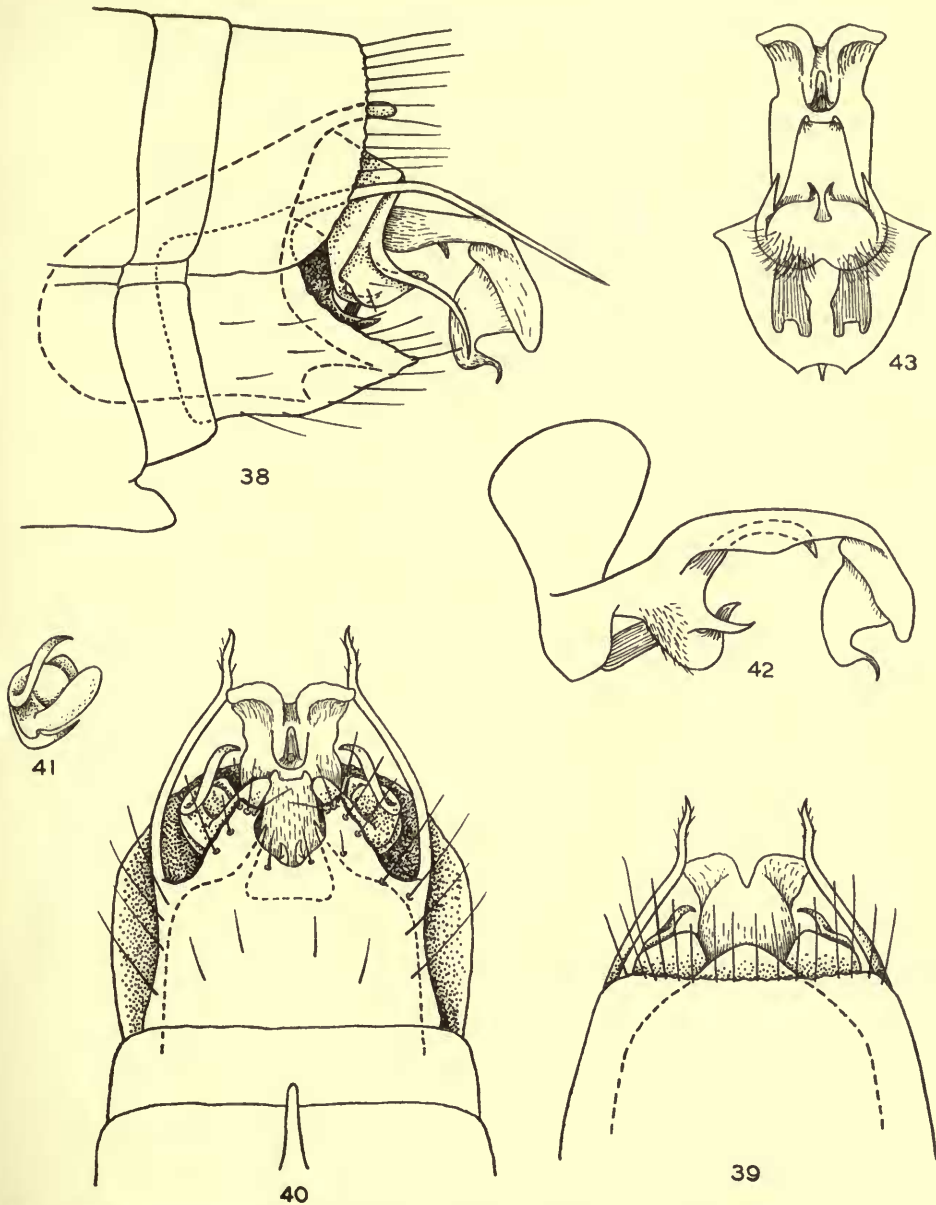
GENITALIA, ♂. Margin of the eighth tergite armed with an evenly and closely arranged fringe of long, stiff hairs. Ninth segment completely withdrawn within the eighth and invisible except in a balsam preparation. Intermediate appendages



FIGS. 36-37. *Prooptila liqua*, ♂. 36, Genitalia, dorsal; 37, seventh, eighth and ninth segments, ventral.

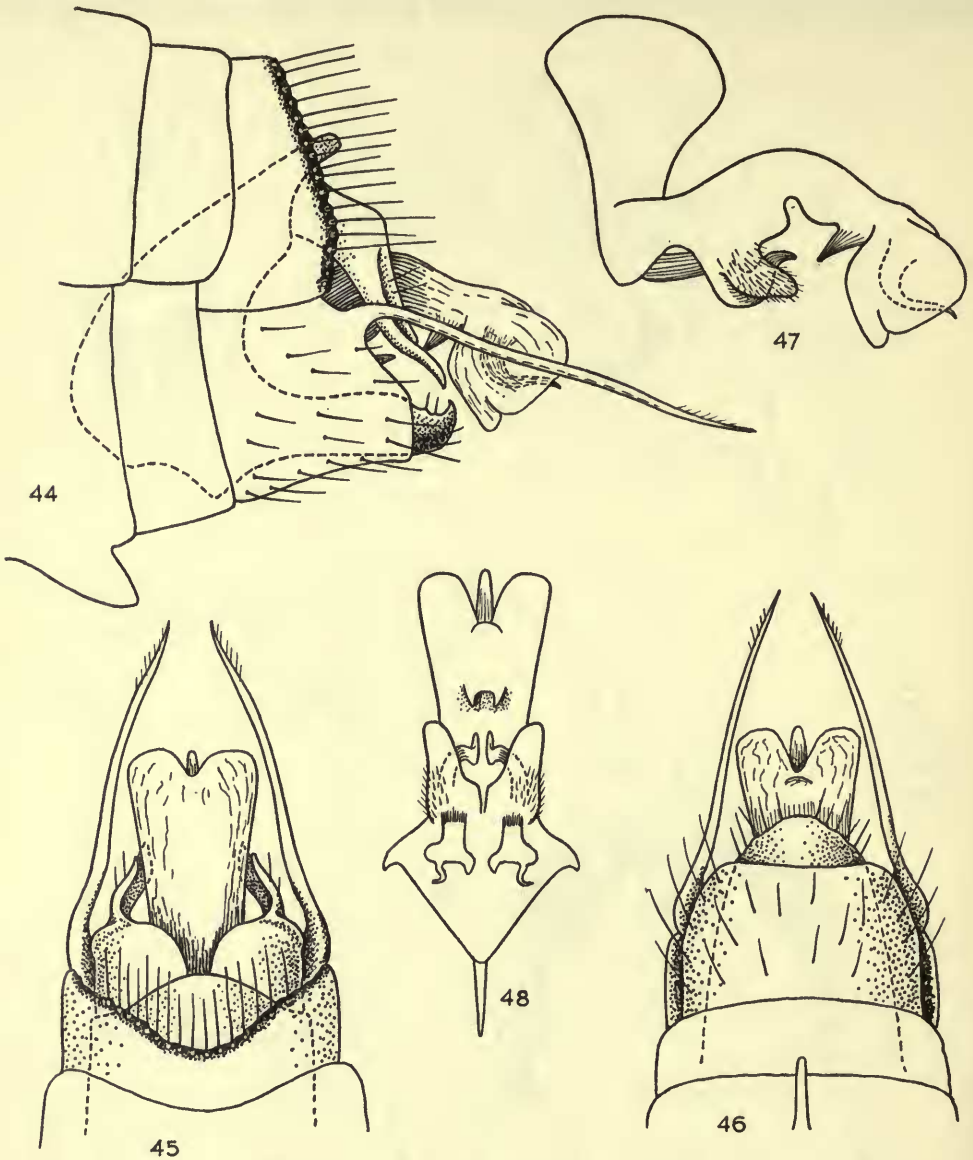
two-jointed, basal joint from above short and wide, terminal joint armed with two strongly chitinized spines, the upper from above sinuous and slender, directed upward, inward and distally, the lower much stouter and directed downward,

terminating in an acute beak. Penis with the usual axe-headed extension of the basal upper margin, apex membranous with a pair of large, stout spines at the base of the membrane, directed downward, a single sinuous spine under the apex, also



FIGS. 38-43. *Protoptila guata*, ♂. 38, Genitalia, lateral; 39, genitalia, dorsal; 40, genitalia, ventral; 41, intermediate appendage, ventral; 42, penis, lateral; 43, penis, ventral.

directed downward. Towards the base of the penis are two pairs of branches terminating in beak-like apices, the outer directed inwards, the inner distally;



FIGS. 44-48. *Protoptila tojana*, ♂. 44, Genitalia, lateral; 45, genitalia, dorsal; 46, genitalia, ventral; 47, penis, lateral; 48, penis, ventral.

still nearer the base is a pair of chimney-pot-shaped processes, apices fringed with stiff hairs. Penis-sheaths wanting. Lower margin of the eighth sternite furnished with four pairs of spine-like processes; from beneath, the shortest pair at the centre

with a longer pair outside ; the other two pairs, which are the longest, arise near the pleurite. Seen from beneath, the outer of these lateral pairs is calliper-shaped, the inner straight, directed inwards with the apices touching.

Length of anterior wing ♂, 4 mm.

MEXICO : Liquidamber, 1130 m., 19.iii.1931. La Prusia, 1075 m., 25.iii.1931.

Type, ♂ (microscope preparation), Liquidamber, 19.iii.1931.

***Protoptila guata* sp. n.**

(Figs. 38-43)

Neuration, anterior wing as in *P. liqua*, posterior as in *P. delaca*.

GENITALIA, ♂. Distal margin of the eighth tergite straight, serrate and fringed with long hairs ; the sternite is produced in a pair of rather short processes with truncate apices separated from each other by a wide excision. The upper angle of the sternite is produced in a long, sinuous spine, sparsely clothed with short hairs towards the apex. Ninth segment with only its upper margin visible, forming a wide, shallow, angular projection from above and a short spur from the side ; lower margin, only to be seen in a cleared specimen, produced in a pair of sharp processes divided from each other by a wide excision. Intermediate appendages two-jointed, basal joint large, in side view with its lower angle produced in an up-curved, sickle-shaped hook ; the second joint is bifurcate, upper fork long, slender and sinuous, curving downward, lower fork stout, curving upward from the side, somewhat sausage-shaped and sloping inwards from beneath. Penis dilated at the apex and excised, with a process on its under surface, wide at the base, terminating in a chitinous hook directed downward. There is a pair of hooks arising about the centre, also on the under side and curving downward. Lower penis-cover as figured. Penis-sheaths wanting.

Length of anterior wing, ♂, 3 mm.

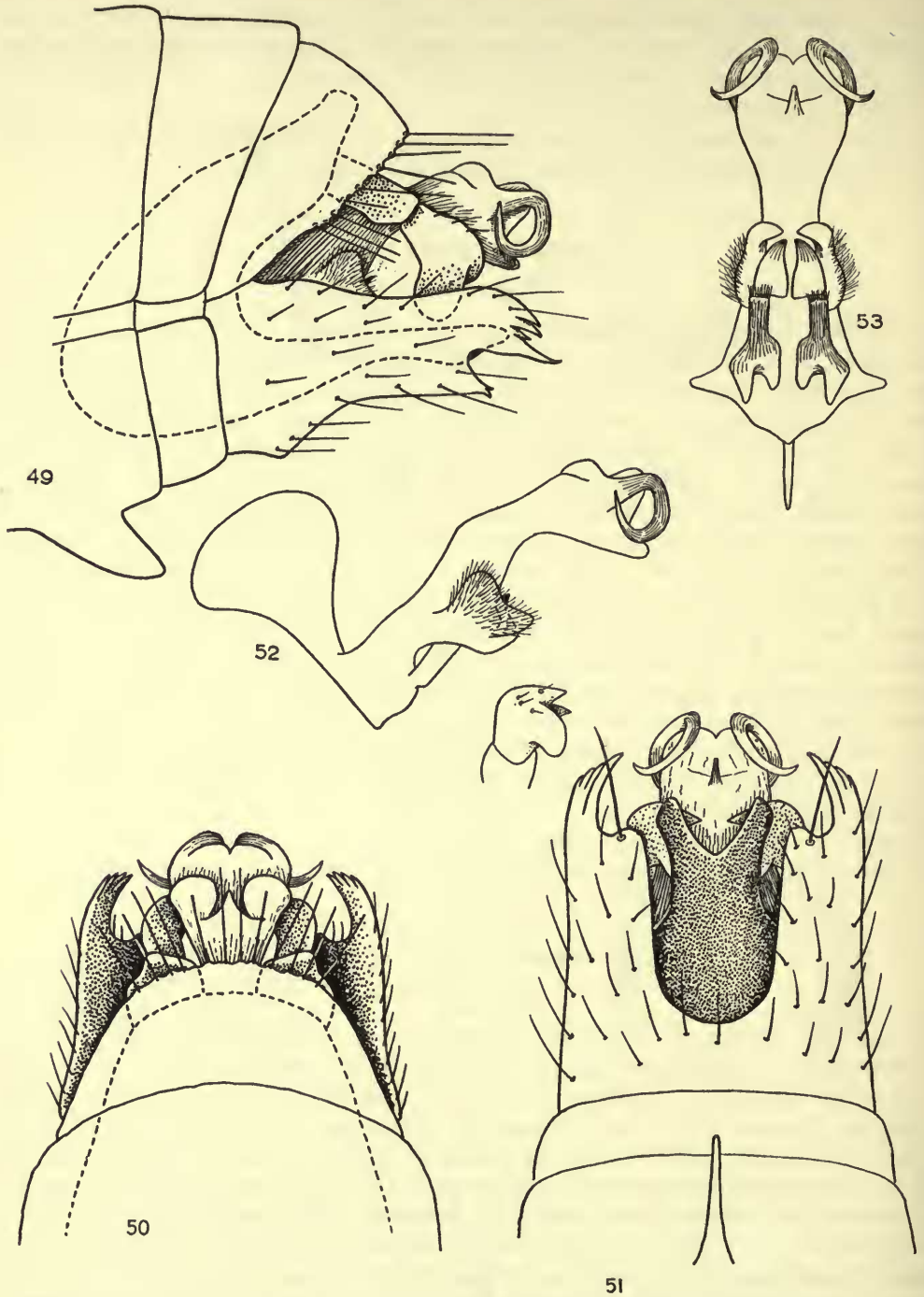
MEXICO : Sinaloa, Badiraguata, 30.iii.1932, 1 ♂ (microscope preparation).

***Protoptila tojana* sp. n.**

(Figs. 44-48)

Neuration, anterior as in *P. liqua*, posterior as in *P. delaca*.

GENITALIA, ♂. Distal margin of the eighth tergite widely and deeply excised to show the rounded distal margin of the ninth segment in the excision ; the margin is strongly fringed, dentate and pigmented. The sternite is only slightly produced beyond the tergite and bears on each lateral margin a very long spine directed distally and sparsely fringed towards the apex ; the distal margin of the segment is not excised but merely slightly concave. Ninth segment partly withdrawn within the eighth to leave just the apical margin above and beneath visible, the upper showing as a blunt knob, the lower as a stout, upwardly directed hook. Intermediate appendages with the terminal joint produced from a broad, stout base in a pair of strongly chitinized, superimposed, sinuous spines, the upper the shorter ; basal



FIGS. 49-53. *Protoptila delaca*, ♂. 49, Genitalia, lateral; 50, genitalia, dorsal; 51, genitalia and apex of intermediate appendage, ventral; 52, penis, lateral; 53, penis, ventral.

joint of the appendage obscure. Penis with a membranous apex containing a hooked spine arising from its under surface; from above and beneath, the penis widens to an excised apex. Lower penis-cover as shown in the figure. Penis-sheaths wanting.

Length of anterior wing, ♂, about 2.5 mm. (wing broken at base).

MEXICO: Chiapas, Jonata, 2.xi.1932, 1 ♂ (microscope preparation).

***Protophila delaca* sp. n.**

(Figs. 5, 49-53)

Neuration, posterior wing as figured, anterior as in *P. liqua*.

GENITALIA, ♂. Distal margin of the eighth tergite rounded and serrate, fringed with long, stiff hairs. Sternite cleft, forming a wide, deep excision, base rounded, the sides of the excision with truncate apices, of which the outer angles are produced in three or four long, pointed fingers or teeth of varying length. From the side it may be seen that the lowest of these dentate processes is separated from the others by a rounded excision. Ninth segment with the dorsal margin withdrawn into the eighth, ventral margin from beneath appearing in the excision of the eighth as a stout, blackened, bifurcate structure, the apices of the forks obliquely truncate. Intermediate appendages two-jointed, curling down and under the penis; basal joint broad from above, rather long and narrow from the side; terminal joint with a rounded outer lobe and an inner, in-turned spur extending nearly half-way across the penis; a second small spur between this spur and the rounded lobe can be made out in a balsam preparation. Penis from above with the apex dilated in two pairs of superimposed lobes, the upper the smaller; arising from the margin of the lower is a pair of corkscrew spines, the apices directed outwards; from beneath is seen a short central spine directed distally. Lower penis-cover as shown in the figures. Penis-sheaths wanting.

Length of anterior wing, ♂, 3.5 mm.

MEXICO: Vera Cruz, Cardel, 3.viii.1932, 1 ♂ (microscope preparation).

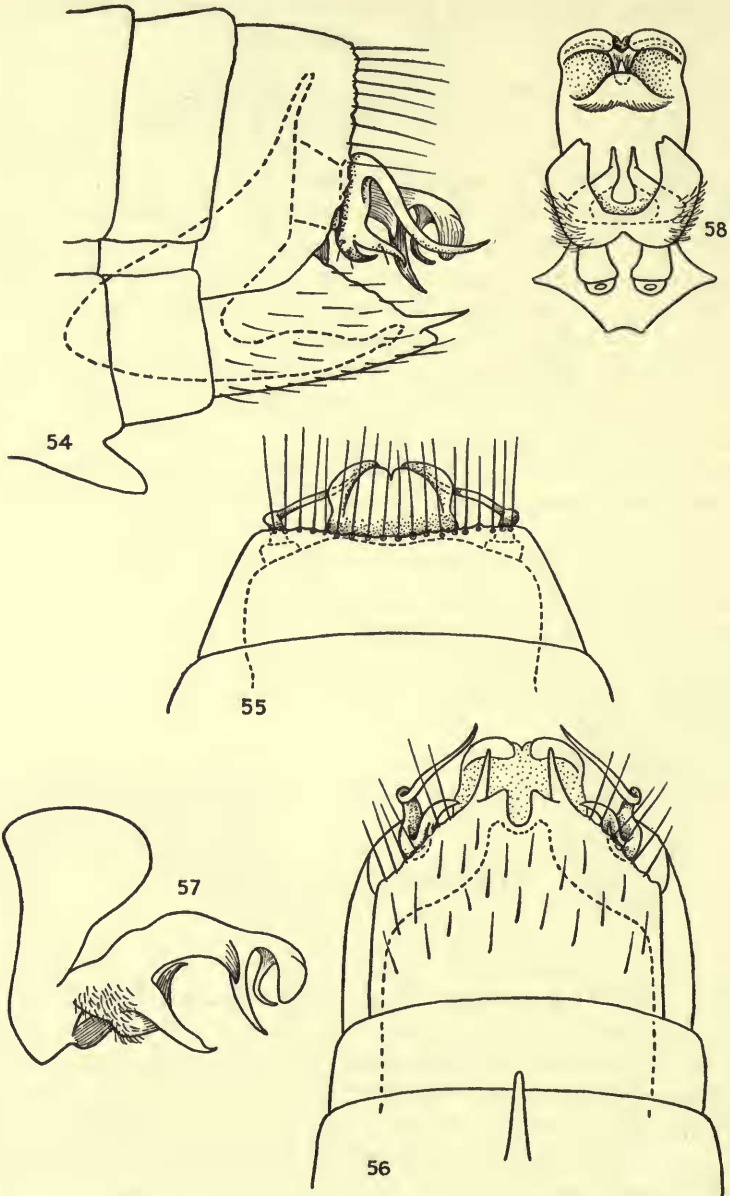
***Protophila lorada* sp. n.**

(Figs. 54-58)

Neuration, anterior wing as in *P. liqua*, posterior as in *P. cardela*.

GENITALIA, ♂. Eighth tergite with the distal margin straight and slightly dentate; the margin of the sternite with a narrow, rounded and not very deep excision, near which it is produced in a pair of shortish and very acute projections or spurs. Ninth segment entirely withdrawn into the eighth; in a cleared preparation, the dorsal margin is undulating, ventral produced at its centre and shallowly excised at the centre of the produced portion. Intermediate appendages two-jointed, basal joint somewhat rectangular, apical joint bearing three sinuous spines of which the upper is the longest and, from the side, rather widely separated from the two lower. Penis with a membranous, excised apex, armed on its lower surface, as seen from the side,

with three stout spines, of which the most distal is considerably curved, the central longer and nearly straight, the basal short and beak-like. Structures towards the base, including two more hooked processes, probably form part of the lower penis-cover. Penis-sheaths wanting.

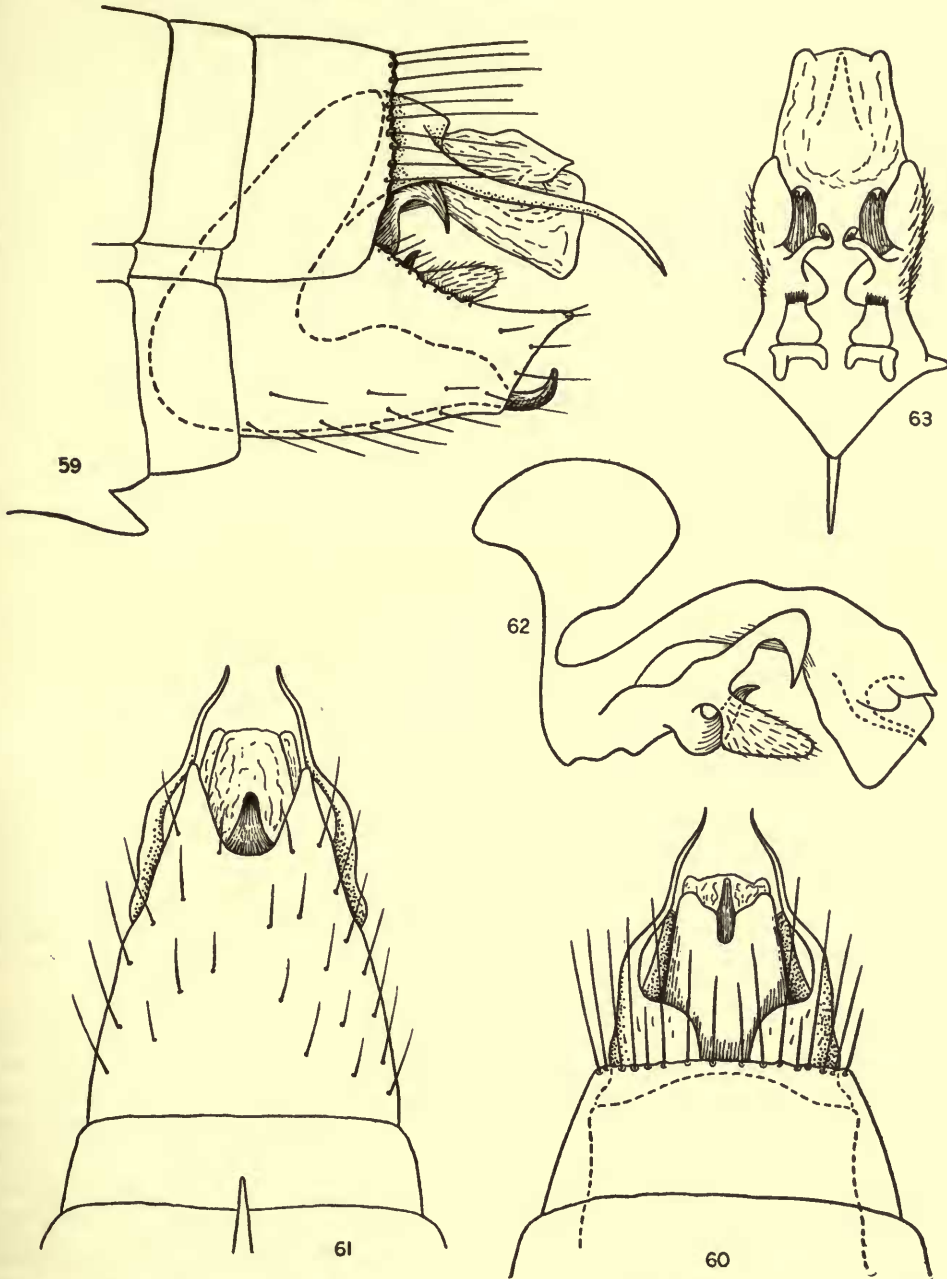


FIGS. 54-58. *Protoptila lorada*, ♂. 54, Genitalia, lateral; 55, genitalia, dorsal; 56, genitalia, ventral; 57, penis, lateral; 58, penis, ventral.

Length of anterior wing, ♂, 2.25 mm.

MEXICO: Guerrero, Tierra Colorada, 18.xii.1929.

Type, ♂, mounted as a microscope preparation.



FIGS. 59-63. *Protoptila cardela*, ♂. 59, Genitalia, lateral; 60, genitalia, dorsal; 61, genitalia, ventral; 62, penis, lateral; 63, penis, ventral.

Protophila cardela sp. n.

(Figs. 4, 59-63)

Neuration, posterior wing as figured, anterior as in *P. liqua*.

GENITALIA, ♂. Ninth segment only visible as a small ventral hook, the remainder being completely withdrawn into the eighth. The dorsal margin of the latter is straight, fringed with very long hairs; from beneath it is deeply excised to leave prominent outer angles separated by a deep, round-based excision. From the side the distal margin is obliquely truncate, the extreme distal angle appearing considerably above the hooked termination of the ninth segment. Intermediate appendages unusual in construction, apparently single-jointed, with a broad base, lateral outer angle produced in a very long, sinuous spine. Penis from above broad and rectangular, upper surface with the apex excised, lower surface projecting beyond it; imbedded in the membranous apex is a sinuous spine arising from a broad base. Other structures of the penis, possibly a complicated form of lower penis-cover, as shown in the figures. Penis-sheaths wanting.

Length of anterior wing, ♂, 2.75 mm.

MEXICO: Vera Cruz, Cardel, 3.viii.1932, 1 ♂ (microscope preparation).

A very unusual form of *Protophila*, with no apparent penis-sheaths and a single-jointed intermediate appendage.

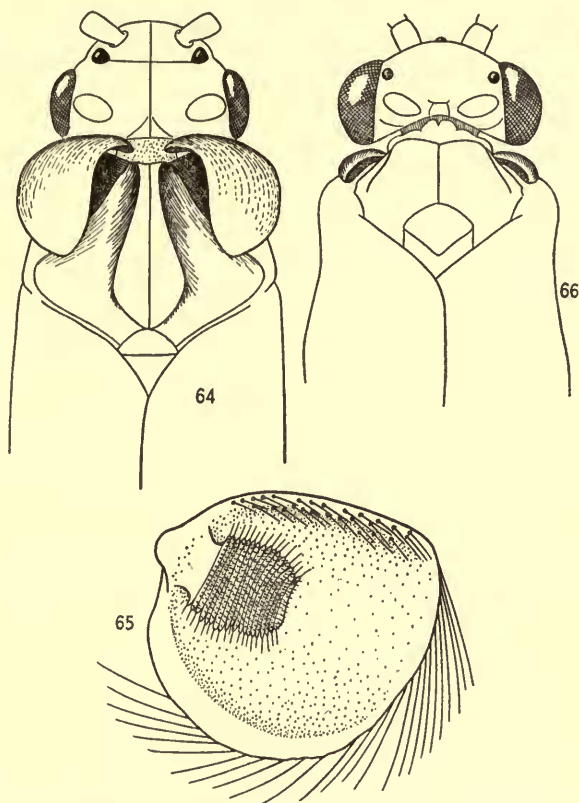
Culoptila gen. n.

(Figs. 64-66)

This genus has so far only been recorded from Mexico. Its most striking feature is the development of the tegulae, which are enlarged in the male from mere plates to huge caps, containing at their bases concertina-shaped structures which probably function as scent-organs. Whilst such structures are generally extensile or ever-sible, I believe that in *Culoptila* the organ is fixed as in the shape shown in the figure. The material at my disposal is plentiful and in the large number of examples passed through KOH, there is no sign of any expansion or extension of the structures. As may be seen in the figures, the edges of the folds are armed with bristles. *Culoptila* may also be distinguished from *Protophila* and other genera in the group by the neuration and characters of the genitalia.

In the anterior wing, forks nos. 1, 2, 3 and 4 are present, fork no. 4 being absent in *Protophila* and other allied genera. As with these allied genera, there is a short row of stiff bristles arising from the posterior edge of Cu_2 , which is considerably thickened. In the posterior wing the neuration is variable and possibly even occasionally aberrant, as is shown in the figures of *C. aluca*. Ocelli present. Spurs 0, 4, 4. There is always a prolongation of the upper distal margin of the ninth segment covering a pair of in-turned hooks of varying shape. There is a large, shield-shaped upper penis-cover. The penis is very obscure; there are, in every species, two black spines of unequal length and the presence of an apparent duct at the base of one of them suggests that these may be penis and sheath. The structure which

I have doubtfully termed the lower penis-cover is in all species bifurcate, and in cleared examples is seen, in the side view, to be connected far back in the fifth segment with the upper penis-cover. The ventral process of the sixth sternite is peculiar in shape in all species and from the side is seen as a rounded or oval lobe attached to the sternite by a short stem.



FIGS. 64-66. 64, Head and thorax of *Culoptila aluca*, ♂, dorsal; 65, tegula of *C. aluca*, ♂, showing scent-organ; 66, head and thorax of *Allotrichia pallicornis* Eaton.

Type species, *Culoptila aluca* sp. n.

Culoptila aluca sp. n.

(Figs. 67-69)

Insect brownish, neurulation as figured.

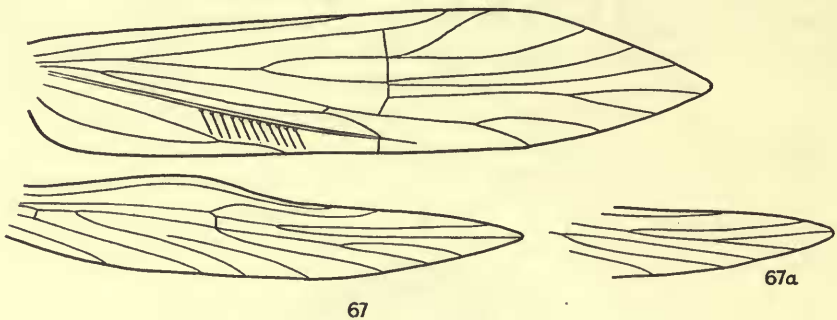
GENITALIA, ♂. Ninth dorsal segment produced. Beyond it there is a large dorsal plate which, from above, entirely obscures the genitalia. Arising from its underside, near the base, is a down-turned process terminating in a bifurcate apex, outer fork long and down-curved, inner rounded, armed at its apex with a few bristles.

There is a very large, shield-shaped upper penis-cover and a pair of asymmetric spines, the longer of which may be the penis, the shorter its sheath. At the centre of the margin of the eighth sternite is a process which may be the lower penis-cover, with outer wings and a central plate bearing, on each side, a blunt projection of its apical margin, armed with a pair of bristles. Inferior appendages (?) short, slightly curved.

Length of anterior wing, ♂, 2 mm.

MEXICO: Guerrero, Cocula, 28.iii.1935, Tierra Colorada, 18.xii.1929; Michoacan, Caracuaro, 1197 m., 24-29.iv, 3-5.v.1935, Nocupetaro, 9.v.1935; Huetamo, 8.vii.1935.

Type, ♂ (microscope preparation), Caracuaro, 24-29.iv.1935.



FIGS. 67-67a. *Culoptila aluca*, ♂. Wings; 67a, apex of posterior wing of another example.

Culoptila amberia sp. n.

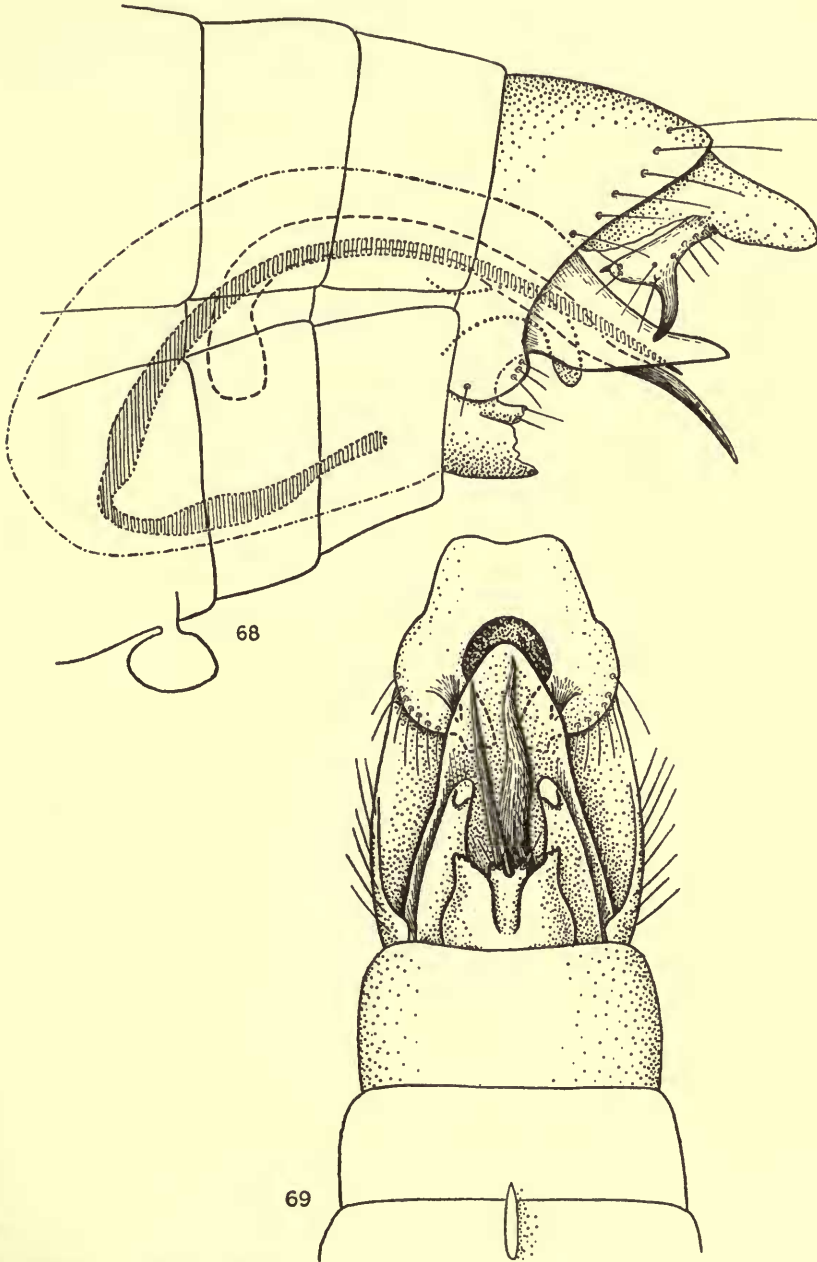
(Figs. 70-72)

Anterior wing as figured, both posterior wings too incomplete for description.

GENITALIA, ♂. Ninth segment extending downwards only slightly below the pleurite of the eighth. Dorsal plate produced, apex truncate, directed downward in side view; from its underside arises a pair of stout, in-curving hooks with their sub-acute apices nearly meeting. Upper penis-cover from beneath wide at the base, becoming somewhat abruptly sub-acute at the apex, the formation of the structure obscure; from the side it is broad, with a truncate apex and there are indications that it may consist of two structures superimposed. Penis and sheath in the form of two blackened spines, the longer being probably the penis. Inferior appendages invisible except in cleared material; they lie above what I suppose to be the lower penis-cover and are short and sinuous, curving slightly outward as seen from beneath. Lower penis-cover consisting of a pair of large arms separated from each other by a wide, rounded excision, each apex armed with one or two stout bristles.

Length of anterior wing, ♂, 2.75 mm.

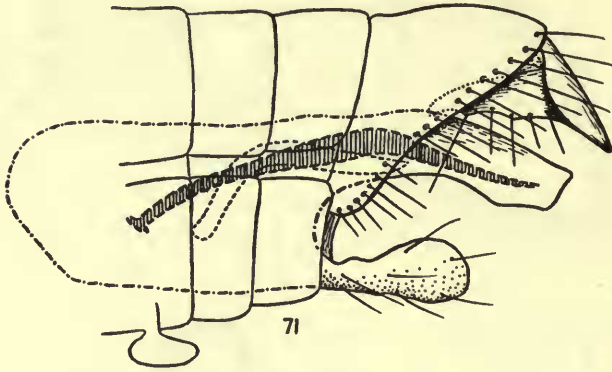
MEXICO: Liquidamber, 19.iii.1931, 1 ♂ (microscope preparation).



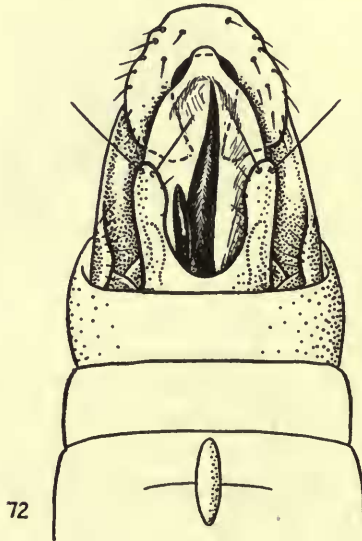
Figs. 68-69. *Culoptila aluca*, ♂. 68, Genitalia, lateral; 69, genitalia, ventral.



70

FIG. 70. *Culoptila amberia*, ♂. Anterior wing.

71



72

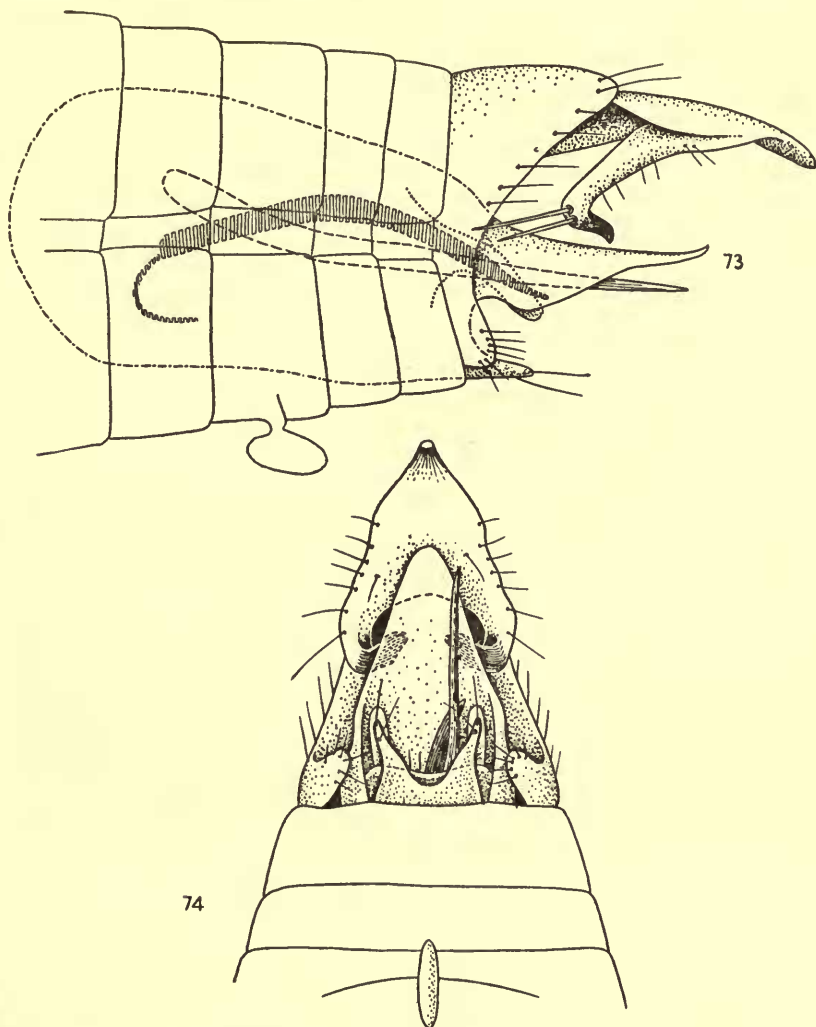
FIGS. 71-72. *Culoptila amberia*, ♂. 71, Genitalia, lateral; 72, genitalia, ventral.

Culoptila rusia sp. n.

(Figs. 73-74)

Insect brownish, neuration as in *C. aluca*.

GENITALIA, ♂. Dorsal plate much produced and very narrow at the sub-acute apex, which is directed slightly downward; at the base, on the underside, are two large, in-curving hooks or processes with blackened apices, sinuous from the side.



FIGS. 73-74. *Culoptila rusia*, ♂. 73, Genitalia, lateral; 74, genitalia, ventral.

Upper penis-cover shield-shaped, apex sub-acute, from the side with the lower margin produced downward in a large triangular flap, apex produced and acute. Penis and sheath in the form of two blackened spines, the shorter being probably

the penis. Inferior appendages short, curving downward. Lower penis-cover with a pair of widely divergent, lateral arms and a quadrate plate dimly seen beneath it.

Length of anterior wing, ♂, 2 mm.

MEXICO: La Prusia, 1075 m., 25.iii.1931; Belisario, Dominguez (San Geronimo), Chiapas, 6.v.1935. (The place is situated near the swift-running Huixtla River, with cataracts and waterfalls.)

Type, ♂ (microscope preparation), La Prusia, 25.iii.1931.

Culoptila saltena sp. n.

(Figs. 75-76)

Neuration as in *C. aluca*.

GENITALIA, ♂. Ninth segment produced dorsally, slightly shallower than the eighth, lower distal margin terminating in a rounded knob as seen from the side. There is a dorsal plate which, from beneath, is seen to bear on the under surface two in-turned claws enclosing an oval space. Apical margin of the plate arises from a narrowish stem, broadened towards the distal, truncate margin, of which the upper angle is produced in a sharp spur, lower forming an inwardly directed hook. Upper penis-cover shield-shaped as in *C. aluca*. There are two black, asymmetric spines, of which the longer is probably the penis. Inferior appendages short and curved. Lower penis-cover broad, with divergent, narrow, triangular, lateral arms, apices notched from the side; behind it a quadrate plate whose excised distal margin appears between the arms.

Length of anterior wing, ♂, 2mm.

MEXICO: Huixtla, 21.xi.1930; Saltenango de la Paz, 15.iii.1931; Morelos, Cuernovaca, 1542 m., southern slopes of the Central Tableland, many brooks in deep-cut valleys, 8-11.vi.1932.

Type, ♂ (microscope preparation), Huixtla, 21.xi.1930.

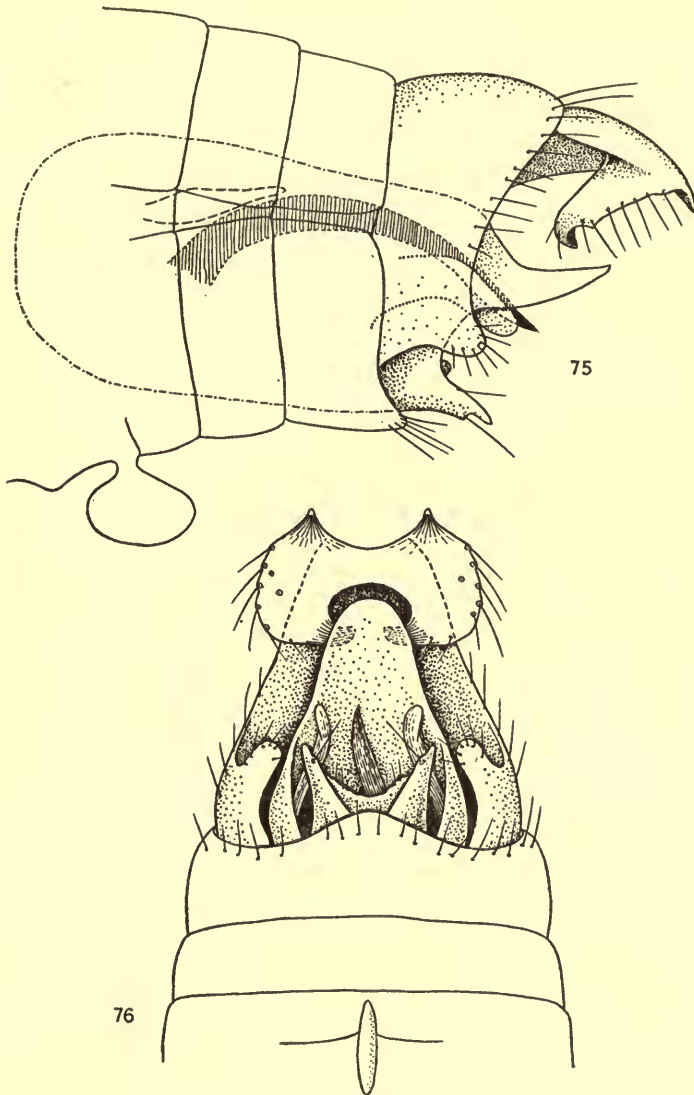
Mexitrichia meralda sp. n.

(Figs. 77-79)

Insect very similar in general appearance and neuration to *M. leroda* Mosely.

GENITALIA, ♂. To the margin of the ninth dorsal segment is jointed a large plate, probably fused superior appendages, with a rounded excision of the distal margin, the outer angles produced, blackened and incurved like a pair of horns. From the side the plate is wide at the base, with a sinuous lower margin, the upper being straight until it approaches the apex, where it is abruptly bent downward; the apex of the plate terminates in a blackened, distally and slightly downwardly directed beak. Upper penis-cover long, spine-like, straight from above, curving slightly upwards from the side, with a slightly thickened base. Penis broad and fleshy, not exerted in the type as is shown in *leroda*; the two terminal black spines, so conspicuous in *leroda*, are doubtfully shown in *meralda* and appear to be directed

basally. Sheaths long, somewhat ribbon-shaped. Lower penis-cover from below with two outstanding wings as in *leroda*, and a very long, twisted spine arising from the centre and extending beyond the penis; the surface is covered throughout its length with a few small teeth.



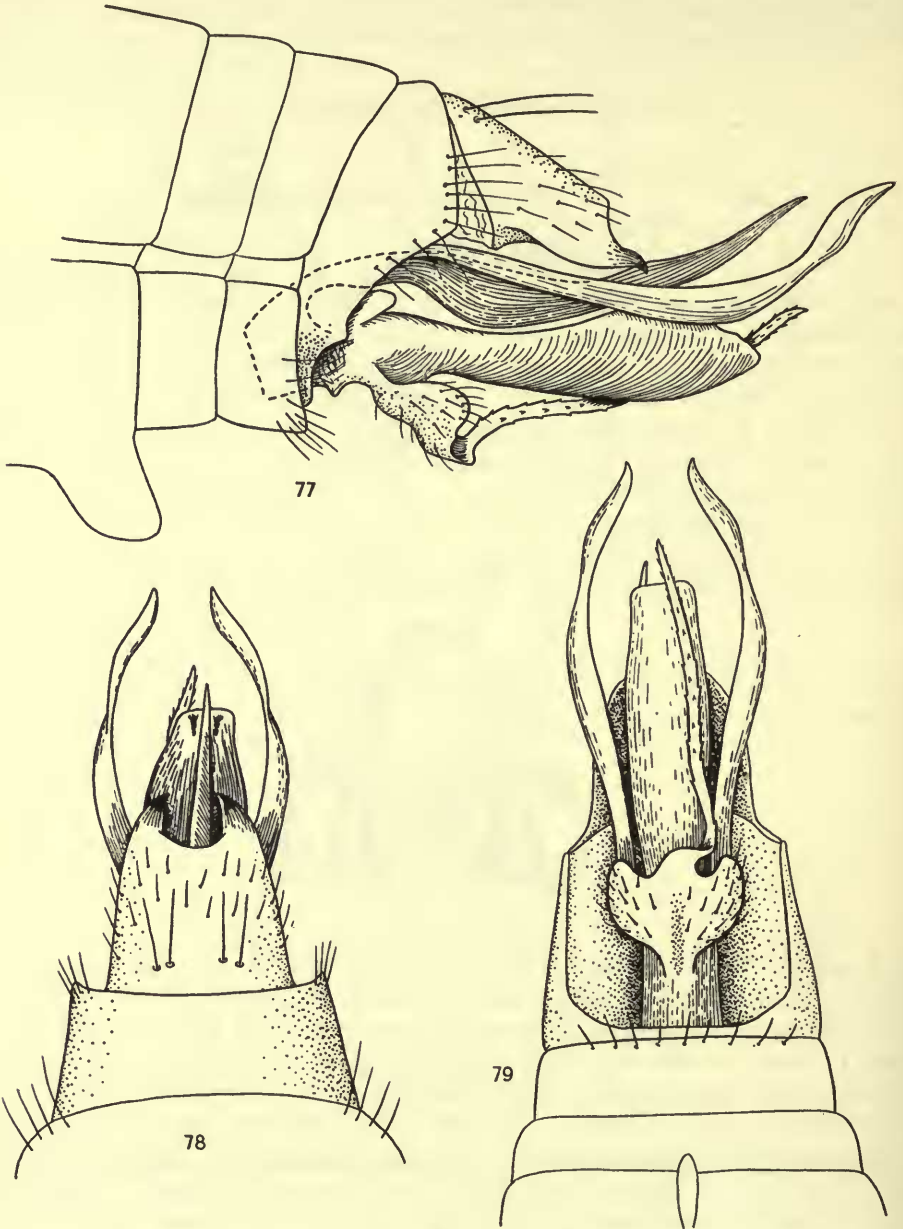
FIGS. 75-76. *Culoptila saltena*, ♂. 75, Genitalia, lateral; 76, genitalia, ventral.

Length of anterior wing, ♂, 3 mm.

MEXICO: Huixtla, 21.xi.1930; Esmeralda, 545 m., 19.xi.1930; Morelos,

7, 21.iv.1932; Montecristo de Guerrero, 11.iii.1931; Michoacan, Caracuaro, 25.iv.1935.

Type, ♂ (microscope preparation), Huixtla, 21.xi.1930.



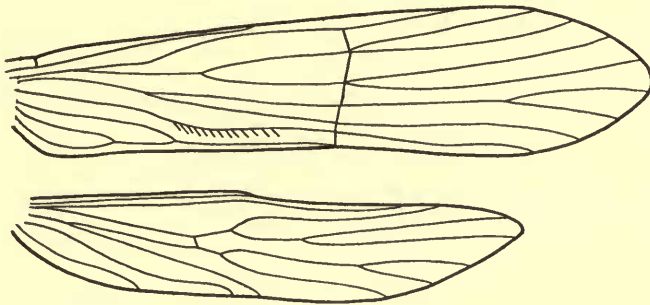
FIGS. 77-79. *Mexitrichia meralda*, ♂. 77, Genitalia, lateral; 78, genitalia, dorsal; 79, genitalia, ventral.

Mexitrichia rancura sp. n.

(Figs. 80-86)

Insect brown. In the neuration there are slight differences between *rancura* and the type species *leroda* as shown in the figure.

GENITALIA, ♂. Dorsal margin of the ninth segment widely excised as in *leroda*. Beyond it is jointed a large plate, apical margin above produced at its centre in an acute triangle, sides bent downward, with acute, blackened apices which, from the side, appear as a beak-like hook directed downward; from this aspect, the produced centre of the plate appears as a large, distally directed beak. Upper penis-cover long, from the side sinuous, from above broadened before the apex. Penis very broad, roughly oblong from the side, from beneath strongly constricted at the middle,



80

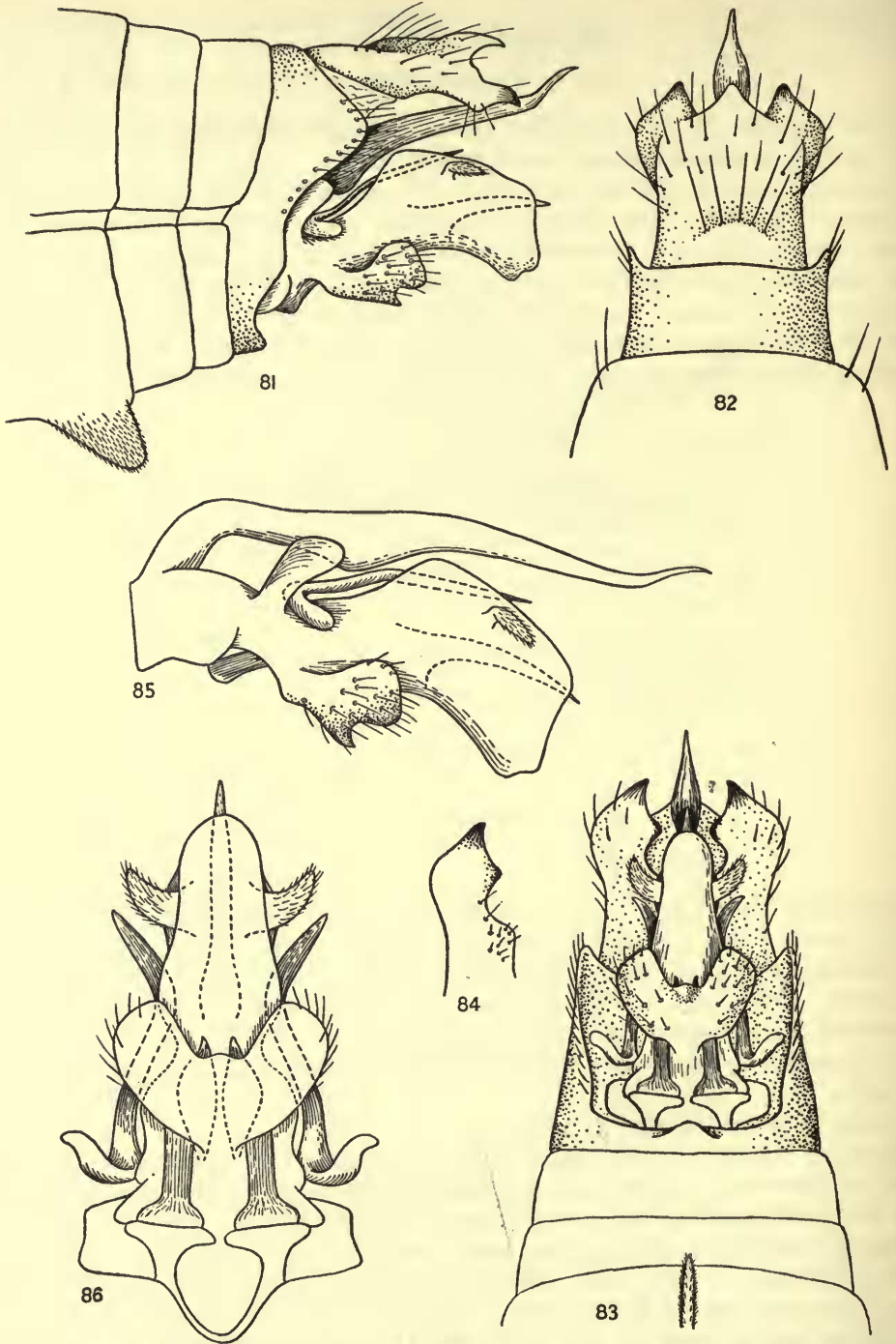
FIG. 80. *Mexitrichia rancura*, ♂. Wings.

tapering from a broad base; arising towards its apex is a pair of laterally outstretched, short, curved horns, densely covered with minute setae. There are two sinuous and strongly chitinized spines, shaped like staples, back to back on each side of the penis. These may be penis-sheaths; their attachment to the penis and lower penis-cover is very obscure. Lower penis-cover with outstretched wings as in the other species of the genus, but with no apparent central spine in the single example available.

Length of anterior wing, ♂, 4 mm.

MEXICO: Barranca Honda, 24.ii.1931, 1 ♂ (microscope preparation).

In the figures of the species, I have included certain structures apparently connected with the penis and the lower penis-cover. These structures are very obscure as to their attachments. They appear also in *meralda*, but as in this species they are even more obscure, I have omitted to figure them or to refer to them in the description of either species. I believe that homologous structures, equally obscure, occur also in the genera *Protoptila* and *Culoptila*. It is perhaps beyond the scope of this purely taxonomic paper to deal with these anatomical features.



FIGS. 81-86. *Mexitrichia rancura*, ♂. 81, Genitalia, lateral; 82, genitalia, dorsal; 83, genitalia, ventral; 84, lateral portion of dorsal plate, ventral; 85, penis with its upper and lower covers, lateral; 86, penis with upper and lower covers, ventral.